

Signal Conditioning Modules

Revision 1/23/14

Pluggable Terminal Block for easy wiring.

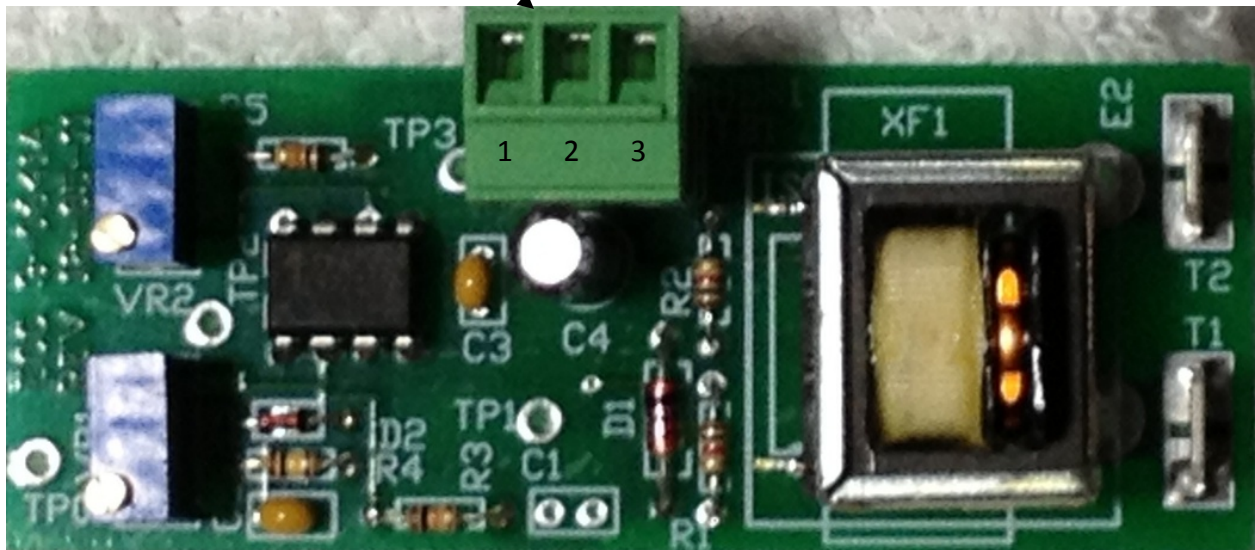


Figure 1. Signal Conditioner with Low Frequency AC Current Transformer.

Specifications:

- Transformer Primary Current: 30 Amperes maximum.
- Transformer Primary Resistance: 250 micro ohms maximum.
- Transformer Typical Output: 110 mV/AMP.
- Frequency: 50 to 400 HZ.
- See TRIAD P/N CSE187-L for additional transformer specifications.
- [Input AC](#) voltage: 0 to 480 VAC.
- Amplifier: Two stage Non-inverting; gain of 100.
- Gain Adjustment: A 10 turn potentiometer for each stage.
- Input Power: 5 VDC @ less than 5 MA.
- Output Range: 0 -5 VDC.
- Mounting: Designed to fit a three inch snaptrack. The snaptrack can be equipped with adapters for DIN Rail mounting. Board size is 2.95 x 1.15 inches.
- Input Connection: 0.250 Faston Tabs.
- Output Connection: MTA100 connector or pluggable terminal block options.
- Operating temperature -40 to +85°C.

Model Number: SCILXPTB-0641 depicted.

Model Number: SCILXMTA-0641 same as depicted except connector is a MTA100.

Application: Any circuit where it is desirable to monitor operation VIA current flow – Lamps, motors, heaters, etc.

See [figure 5](#) circuit description below.

See calibration procedure below.

MTA100 connector for easy connection between signal conditioner and DCB1320 or DCB2620 ADC inputs HDR1 – HDR4.

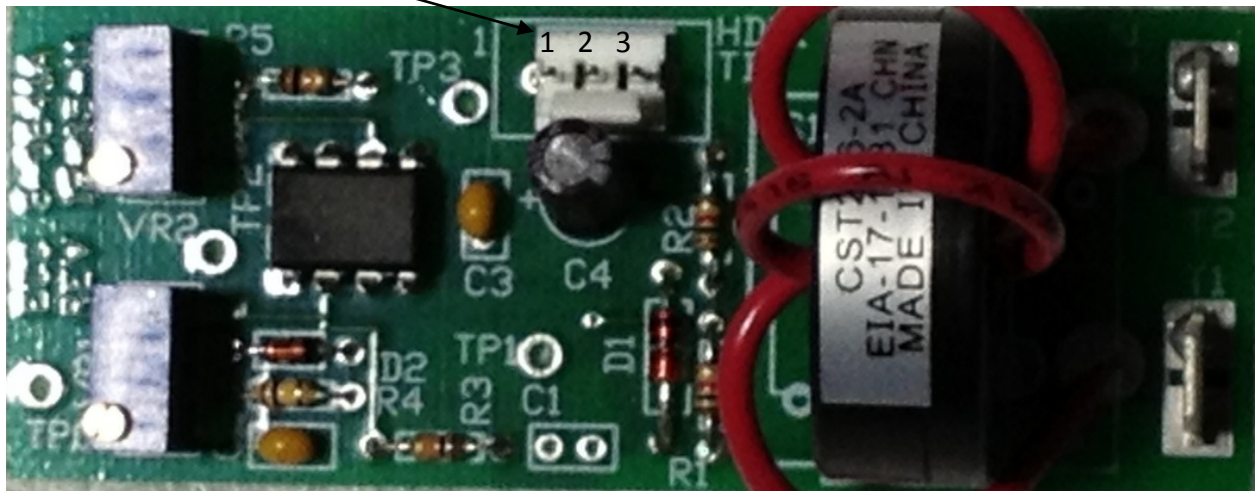


Figure 2. Signal Conditioner with High Frequency AC Current Transformer.

Specifications:

- Transformer Primary Current: 10 Amperes maximum.
- Transformer Primary Resistance: determined by wire length; typically less than 1 ohm.
- Transformer Typical Output: 110 mV/AMP.
- Transformer Frequency: 10 KHZ to 200 KHZ. *
- See TRIAD P/N CST206-2A for additional transformer specifications.
- [Input AC](#) voltage: 0 to 480 VAC.
- Amplifier: Two stage Non-inverting; gain of 100.
- Gain Adjustment: A 10 turn potentiometer for each stage.
- Input Power: 5 VDC @ less than 5 MA.
- Output Range: 0 -5 VDC.
- Mounting: Designed to fit a three inch snaptrack. The snaptrack can be equipped with adapter for DIN Rail mounting.
- Input Connection: 0.250 Faston Tabs.
- Output Connection: MTA100 connector or pluggable terminal block options.
- Operating temperature -40 to +85°C.

*Good performance at 50/60 HZ.

The transformer output voltage is determined by number of turns of wire through transformer, and the current flow in wire. The SCWTXxxx is supplied with one turn of 18 AWG wire through the transformer. For very low milliamp applications, a user can replace the single turn with multiple turns as needed for the application. For current in excess of 10 amperes, the existing wire can be replaced with a suitable AWG passed straight through the transformer. This can handle up to 80 amperes.

Model Number: SCWTXMTA-0641 depicted.

Model Number: SCWTXPTB-0641 same as depicted except connector is a pluggable terminal block.

Application: Any circuit where it is desirable to monitor operation VIA current flow – Lamps, motors, heaters, etc.

See [figure 5](#) circuit description below.

See calibration procedure below.

MTA100 connector for easy connection between signal conditioner and DCB1320 or DCB2620 ADC inputs HDR1 – HDR4.

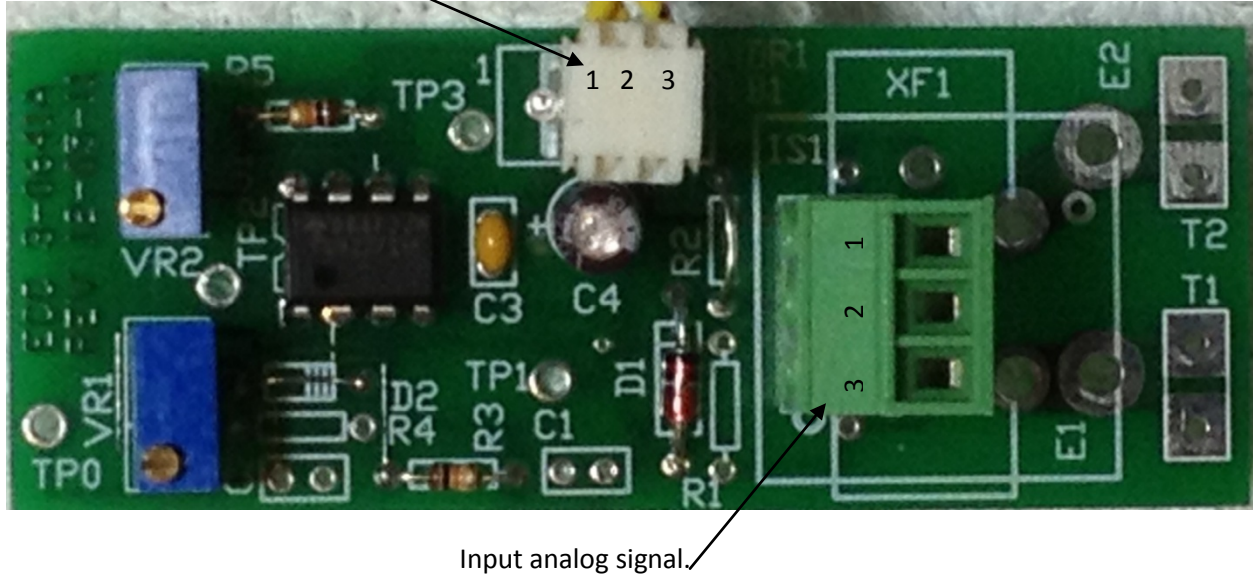


Figure 3. DC model of signal conditioner circuit board.

Specifications:

- Amplifier: Two stage Non-inverting; gain of 100.
- Gain Adjustment: A 10 turn potentiometer for each stage.
- Input Power: 5 VDC @ less than 5 MA.
- Output Range: 0 -5 VDC.
- Mounting: Designed to fit a three inch snaptrack. The snaptrack can be equipped with adapter for DIN Rail mounting.
- Input Connection: Pluggable Terminal Block.
- Output Connection: MTA100 connector or pluggable terminal block options.
- Operating temperature -40 to +85°C.

Model Number: SCDCMTA-0641 depicted. MTA100 output connector.

Model Number: SCDCPTB-0641. Pluggable terminal block output connector.

See [figure 6](#) circuit description below.

Typical application Example:

A 0 – 15 PSI pressure transducer used to determine water level in a tank outputs 0 to 5 VDC. To monitor 0 to 2 PSI (4.62 ft.) and get a more accurate reading, use a signal conditioner to yield 0 to 5 volts over the 2 PSI range. The volts per PSI without a signal conditioner is $5/15 = 0.3333$. The 10 bit ADC count per PSI is $1024/5 * 0.3333 = 68.26$. Using signal conditioner, volts per PSI = $5/2 = 2.5$. The 10 bit ADC count per PSI = $1024/5 * 2.5 = 512$.

In terms of inches of water, without a signal conditioner the resolution is as follows:

$15 \text{ PSI} * 2.31 \text{ ft/PSI} * 12 \text{ inches/ft} = 415.8 \text{ inches}$

$\text{ADC count/inch} = 1024/415.8 = 2.46 \text{ counts/inch}$, or $0.407 \text{ inches/ count}$.

With a signal conditioner the resolution is:

$2 \text{ PSI} * 2.31 \text{ ft/PSI} * 12 \text{ inches/ft} = 55.44 \text{ inches}$

$\text{ADC count/inch} = 1024/55.44 = 18.47 \text{ counts/inch}$ or $0.054 \text{ inches/count}$.

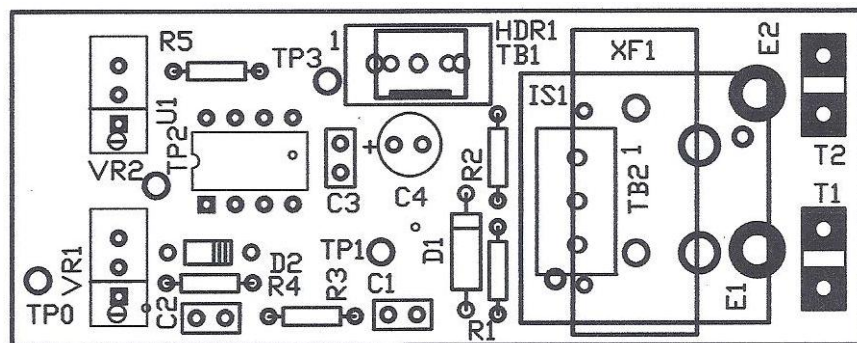


Figure 4. Circuit Board Layout

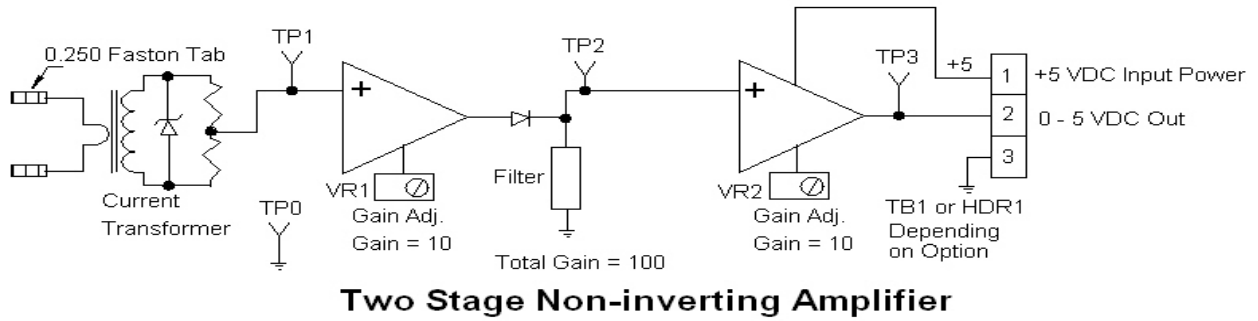


Figure 5. Signal Conditioner with AC Current Transformer Input.

[SCILXPTB-0641](#) [SCWTXMTA-0641](#)

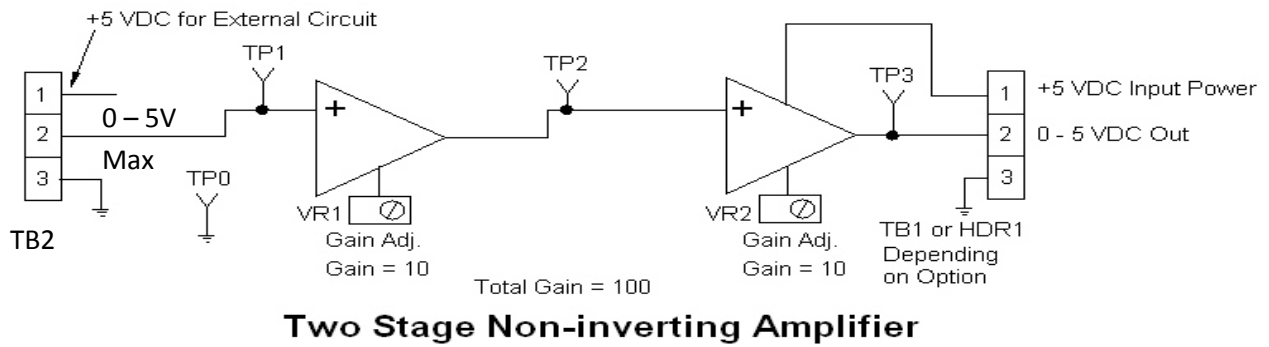


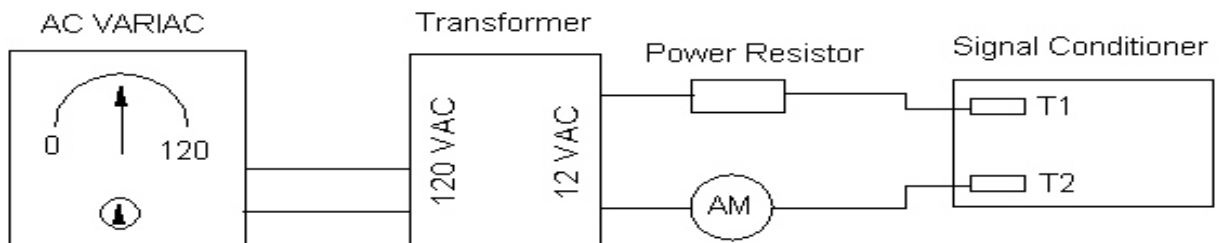
Figure 6. DC Input Signal Conditioner.

[SCDCMTA-0641](#)

Calibration of AC Signal Conditioner:

Caution: This should only be done by a person qualified to work with electrical circuits.

An easy and safe method of calibrating a signal conditioner with a current transformer is to use a low voltage transformer with sufficient output current to handle the maximum the application requires. The primary of the transformer can be controlled with a variac, or the maximum current to be measured can be controlled with a power resistor. With the maximum current limited to the application maximum, connect the controlled current source to Faston tabs T1 and T2. Adjust VR1 and VR2 to yield a 5 VDC output at TB1,2/HDR1,2.



Select power resistor to limit current to a level that does not exceed ratings of devices.
Adjust VARIAC for maximum needed current as indicated by ammeter AM.
Using a DC voltmeter, check voltage at test points TP2 and TP3.
Adjust VR1 and VR2 for a 5 VDC at TP3.

Figure 7.

This procedure provides for current monitoring over a full range from 0 AMPS to full calibrated value.

If the application only requires knowledge of the presence or absence of current flow, connect the signal conditioner into a known good working circuit, and adjust for a 5 VDC output at TP3.

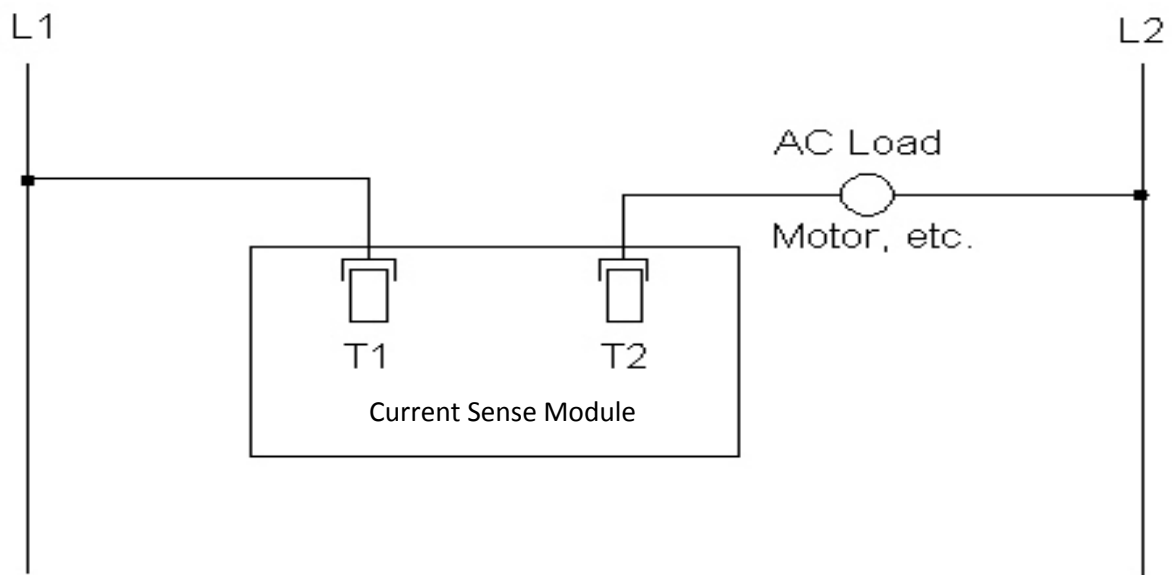


Figure 7. Typical connection for the current sense module.